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ACTUAL ASPECTS OF ESTIMATING INFLUENCE OF MINING ACTIVITIES ON THE ENVIRONEMENT

The scientific progress in the modern period (reached mainly in the European region) was paved by the ontological approach to knowledge, started by Aristotle and developed significantly by Thomas Aquinas. However, in the beginning of the modern period R. Descartes practically refused the ontological approach and due to the enlightenment and positivism the science started to be based on the conclusions formulated by the human intellect on the basis of phenomenological world observations without considering realistic causality of corresponding phenomena. Unrealistic mathematical models started to be constructed and presented as scientific results. In principle such a process has contaminated all scientific disciplines (including Earth sciences). Some problems concerning geophysical problems and basic physical conclusions will be mentioned.

The given anti-ontological approach has been supported mainly from the region of physical science when the physical scientific community refused Einstein's criticism of Copenhagen quantum mechanics in 1935 and this theory became the fundamental theory of matter world on the basis of mistaking assumptions, which influenced negatively not only the science but also the contemporary dangerous way of "scientific" thinking of the prevailing part of scientists. The given deformations in science may be removed only by returning again to the original realistic ontological approach. An appropriate declaration of the geoethical community should signalize needed issues from the actual despair.

1. Introduction

Increasing number of authors dealing in their essays and articles with the situation in contemporary human society pays attention to the big despair existing in it. One Czech author has showed in a very recent essay that this despair has been caused mainly by the loss of capacity to be embarrassed by not respecting natural community norms. This desperation has, of course, a very deep reason; the return to natural social and ethical norms may be hardly reached without knowing the actual background of the corresponding situation.

In the following text we would like to show that for the given situation mainly overestimating of the abilities of the human intellect is responsible as it has followed from the famous declaration *"Cogito, ergo sum"* of R. Descartes (1596-1650) by which the earlier ontological approach to knowledge (started by Aristotle and developed later by Thomas Aquinas) was refused. Then the pride of human intellect has been responsible for the corresponding despair sensation in the whole human society.

In Section 2 we shall describe the corresponding evolution of thinking in the course of the modern period and the impact practically on all branches of science and human knowledge. Limited possibilities of the human intellect in getting certain knowledge and the falsification approach will be discussed in Section 3. Then we shall demonstrate the deviousness of conclusions being done in the field of fundamental theoretical physics (i.e., contemporary quantum physics) and the necessity to go back to earlier true

knowledge (the return to earlier ontology); see Section 4. The phenomenological interpretation of elastic collisions leading to the transparency of elementary microscopic objects will be critically evaluated in Section 5. The impact on the aberrant scientific conclusions on the contemporary thinking of whole human society will be discussed in Section 6. Some concluding remarks will be introduced in Section 7.

2. The evolution of knowledge and thinking of human society in the modern period

2.1 Scientific knowledge and civilization progress

Middle Age knowledge was based fully on the ontological approach started by Aristotle and further developed by Thomas Aquinas. The classical physics proposed by Galileo and Newton was fully based on this approach; also the whole European progress in the modern period and practically the whole contemporary world civilization started from it. However, already in the end of the Middle Ages some conclusions following (seemingly) from ontological reality were done, which were not in the full agreement with all corresponding aspects. These ideas were further developed in the beginning of the modern period and overruled the thinking of not only scientific but of all the human community (mainly in the area of Europe).

2.2 Descartes and contemporary state of scientific knowledge

The decisive impulse to the new approaches occurred when Descartes denoted the human intellect as the decisive source of our knowledge. The following enlightenment and positivistic approach influenced then also individual science fields (including fundamental physics) in this direction. The main change in physics caused by the new approach occurred when in the middle of the 19^{th} century Boltzmann declared one newly established macroscopic phenomenon (extending average distribution of microscopic objects in a greater system) as a natural law. However, the decisive step having influenced fundamentally the contemporary science was done by Bohr (in 1927) in trying to describe microscopic processes. In proposing Copenhagen quantum mechanics (CQM) he added some further assumptions to Schroedinger equation, which changed (deformed) fundamentally the original physical interpretation of Schroedinger equation solutions that might be brought otherwise to full agreement with classical properties (except the existence of a smaller set of admitted physical states due to a quantization).

2.3 Mathematical models and phenomenological observation (positive facts?)

Due to quite anti-ontological approaches the main weight was put on the mathematical models and some values obtained by measurement (the so called “positive facts”). No attention has been devoted to causality between sequential states. The goal has been to describe mathematically the observed phenomena without being concerned with the way how the given phenomena have emerged. Practically all conclusions in different scientific fields have been made on such a basis at the present time.

The corresponding mathematical models have been constructed to represent given sets of measured values without taking care of ontological reality. However, the scientists who accepted a corresponding model take it as a proved truth on the basis of falsifying ability principle; if at least one prediction of the given statement has been in agreement with observation and any other model has been refused practically as unnecessary. The pressing activities of well-connected scientific group have decided about the success of different models in scientific society. It has occurred very often that more realistic (closer to the truth) mathematical models have not been admitted to be published in

corresponding journals. That was occurring in the basic physical research as well as in different fields of applied research. Very often the models representing quite neighbour fields represented the corresponding reality in fully different ways; each group gamed on its own pidgin without taking care about neighbours. In the next section we should like to demonstrate the contemporary situation on the case of fundamental theoretical physics which had very great influences also on other region of science and on the way of thinking of the human society.

3. Human knowledge and its certainty

3.1 Human knowledge based on a falsification approach

When we are going to speak about the knowledge we must realize first what it means and what is its source. The need of knowledge relates to the people as human beings with their free will. It influences fundamentally our decision making. It is then the world around us (and including human existence) that represents the main source of our knowledge. Then different statements concerning the world may be formulated on the basis of logical induction, or also with the help of human intuition. However, such a statement may be quite wrong. It is necessary to derive all possible deductions from it and all of them must be confronted with the corresponding reality (if it is possible). If one finds any contradiction the original statement (or a corresponding statement combination) must be declared as invalid (false); and the given piece of negative knowledge must be denoted as certain. Such a falsified statement (or their corresponding combination) must be then declared as intolerable when the truth about our world is to be respected.

There is, of course, fundamental asymmetry between the validity of falsified and non-falsified (plausible) statements. Even if no contradiction has been found the corresponding non-falsified statement cannot be denoted as actually true as one can never know whether a contradiction would not be found when other logical deductions would be derived or other experimental tests proposed and done. However, all non-falsified statements must be taken as acceptable (tolerable); also in the case if some of them are in mutual contradiction. They might represent also acceptable basis for the discussed cultural plurality, before some of corresponding statements will not be excluded on the basis of a falsification approach.

3.2 Binding tolerance and intolerance

The positive statements that have not been falsified cannot be taken as certainly true. However, it is being done in the contemporary science when the principle of falsifying ability has been applied to. In fact, if at least in one case it has been shown that a deduction agrees with observation then the given statement may be considered only as an acceptable truth; the corresponding tolerance may be required, even if other persons prefer different statements being in contradiction. All such statements should be fully tolerated before the decision between them would be given on the basis of falsification.

On the other side, the falsified statements (i.e. not valid with the certainty) must be never regarded as acceptable. They must be taken as strictly intolerable, which has not been respected in the human society especially in the last time. It is possible to say that especially the proponents of these intolerable statements have been most radical in promoting their validity. The human society has been deformed necessarily under their pressure. Some certainly false conclusions have been already adopted even as common establishments by some authorities in the last time.

4. Theory of microscopic world and basic mistakes in contemporary physics

4.1Copenhagen quantum mechanics and the controversy between Bohr and Einstein

The properties of microscopic objects started to be studied intensively since the beginning of the last century. The important step was done in 1925 when Schroedinger proposed his differential wave equation and showed that the tracks of elementary objects (described by Hamilton equations of classical physics) might be derived from its solutions. On the basis of this equation Bohr proposed then his Copenhagen quantum mechanics (CQM) in 1927 by adding two strong assumptions that changed dully its original physical interpretation. In 1935 Einstein refused the CQM on the basis of a *Gedankenexperiment* with the help of which he showed that the given theory involved immediate mutual interaction (some immediate link) of two matter objects at arbitrary distances, which had to be taken as impossible on the basis of standard ontological approach (and standard experience). Bohr refused, however, this objection by having argued that such an interaction might exist between microscopic particles. World scientific community accepted his standpoint, even if nobody was able to indicate where the boundary between micro- and macroscopic regions laid, and also Einstein maintained his standpoint till the end of his life. The situation changed partially after 1952 when it was shown (Bohm) that some quantum physical alternative based on Schroedinger equation and fulfilling Einstein's ontological requirement might be also possible.

4.2 Non-locality (or entanglement) of microscopic particles (Bell's inequality)

Bell tried to contribute in deciding between these two alternatives (mentioned in preceding subsection). He generalized Einstein's *Gedankenexperiment* assuming that not only a mere coincidence detection of two particles emitted from a common source would be measured, but also their coincidence spin orientations (non-classical quantities) would be tested in a corresponding experiment:

$$\| < - - - - |^{\beta} \; - - - - \otimes - - - - |^{\alpha} \; - - - - > \|$$

Bell assumed that an object (of spin zero) decayed in the rest into two spin particles that ran then in opposite directions and passed through two polarizers differently deviated; the probability of coincidence detections for different deviations was then assumed to be measured. Bell derived for a special combination of four measurements the following inequality

$$B = \alpha_1\beta_1 + \alpha_2\beta_1 + \alpha_1\beta_2 - \alpha_2\beta_2 \leq 2$$

where a_j, β_j were detection probabilities in individual detectors in corresponding coincidence arrangements. He derived his famous inequality in 1964; it was then commonly stated that this inequality held in Einstein's alternative but not in CQM, without any corresponding analysis having been performed.

The experiments (testing the given inequality) were proposed and performed; they were finished practically in 1982. Bell's inequality was shown to be violated and the CQM started to be taken as the only theory of microscopic world, differing significantly from classical physics (valid in macroscopic world) even if nobody was taking care about how and at which dimensions it would be possible to pass from microscopic world to the macroscopic one.

It was then argued that the immediate interaction between corresponding microscopic particles at great distances existed between microscopic particles. The given characteristic was not, however, very clear; it was interpreted in two different ways: once as the non-locality of individual microscopic objects, and second as the immediate link between

particles going from one common source. Consequently, the given phenomenon has been denoted also as an entanglement.

4.3 Mistaking interpretation of Bell's inequality

The story of Bell's inequality has been described in many studies and especially the original paper of Bell has been quoted many times (more than 26000 quotations); it has been used as a definite support for the validity of Bohr's CQM. However, it has been shown by us several times in the last fifteen years that the given inequality has been based on a very strong assumption and did not hold in the probabilistic experiment considered by Bell (it hold only in the experiment proposed originally by Einstein where any non-classical characteristic was not added). Consequently, there is not any need for CQM that contains, moreover, some internal logical contradictions (denoted usually as quantum paradoxes). We have tried to call the attention of scientific community to this fact, but we have been successful for the first time practically in February 2012 only, see [1]. Some further details may be found in [2-5].

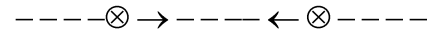
The given papers concerned, however, not only Bell's inequality but also some other shortages (or mistakes) concerning the interpretation of Schroedinger equation. When the original interpretation of Schroedinger equation is saved (and Einstein's ontological requirement fulfilled) the Schroedinger equation might be applied in principle to whole (microscopic as well as macroscopic) physical reality. However, some new questions open (e.g., to explain how quantum states emerge) as it has been mentioned already in [5].

4.4 Necessary return to Aristotle's ontology

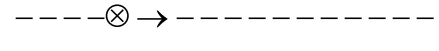
It is evident that the given mistakes must be removed if one should go to true description of corresponding microscopic processes. As to the Bell inequality it is evident that the fulfilling of Einstein's requirement corresponds to returning to Aristotle's ontology (as it was further developed by Thomas Aquinas). It is not more possible to construct some mathematical models only to describe some set of phenomenological values obtained by measurement when the realistic causality is not respected in sequential developments of corresponding physical systems.

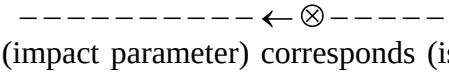
5. Elastic collision processes and transparency of microscopic objects?

Similar problem of mistaking interpretation exists, however, also in the region of collision processes between microscopic particles at higher energies when elastic and inelastic processes exist. For the description of elastic processes the mathematical models are still used that have been proposed already forty years ago. It has been derived from the experimental data with the help of them that the elastic collisions of two microscopic objects (e.g. protons) may be more central than inelastic ones, maximal probability existing at the zero impact parameter:



while the inelastic processes should exist mainly at peripheral collisions





where the track distance (impact parameter) corresponds (is less) to particle dimension, which may be hardly taken as probable.

It has been shown by us that the given result has been obtained when the corresponding formula has been significantly simplified. If the formula has not been simplified the elastic collisions may be interpreted as peripheral process in agreement

with the standard ontological view; see [6]. However, all the time this possibility has been refused by the corresponding scientific community. Only in several last years it has been admitted as an alternative possibility.

However, even if this mistake is removed the given model obtains another anti-ontological assumption; similarly as it has been in the case of Bell's inequality. The optical theorem (overtaken from optics without a proof) has been applied to strong (nuclear) interaction between given microscopic objects (protons). This theorem requires for the differential elastic cross section to be maximal at zero deviation from the original direction. However, it was shown by us recently that the given theorem might be applied approximately to Coulomb interaction (acting at distance and going slowly to zero at very great distance) only, but not to nuclear (strong) interaction that should be interpreted as a contact force being practically zero at any impact parameter value greater than the dimensions of colliding objects. Consequently, the optical theorem cannot be applied in the case of nuclear forces; see [7, 4].

Moreover, in the last time a new ontological collision model has been proposed in Prague that does not contain any unreasoned assumption. It is in principle based only on two main characteristics following from ontological properties of collision processes. The impact-parameter dependence of total collision probability is to be represented by monotonous function decreasing with rising impact-parameter while that of the ratio of elastic and total processes by increasing monotonous function in such a case. The preliminary results obtained with the help of this Prague ontological model have been shown already in [4, 8].

The corresponding results have been interpreted in [8] in the usual limited framework; i.e., on the assumption that the whole collision process has depended on two (Coulomb and nuclear) interactions. We have obtained, however, a special peak in the region of not very small deviations (at rather high collision energy). We have interpreted it as an unusual Coulomb process in [8], which does not seem to be sufficiently reasoned. It seems that this unexpected result opens the way to a much deeper analysis. It seems that it corresponds to the fact that in addition to strong nuclear force also some weaker force (stronger than Coulomb one) may exist. It might indicate that the strongly bound proton center part is encircled by other matter region that is much weakly bounded and might be responsible for the existence of solid substances in our world, too.

The return to realistic ontological approach may open, therefore, quite new and reliable ways to the human knowledge in the next future. However, also a way out of the mentioned despair of human society might be again found on such a base.

6. Ontology and binding duties for any human being

6.1 Human life – the highest value

The ontological reality (i.e., our contemporary world) has been developing for a very long time. This development started, of course, evidently from some much simpler beginnings. Some greater steps (transitions to different living objects) occurred surely during this development. However, it lies beyond the possibility of our intellect to understand the way how it might be realized. It is also beyond our possibilities to know whether or how the further development of the contemporary world (including the abilities of human beings) will continue.

It is evident that the highest value in our world is to be represented by the life of human beings with corresponding spiritual abilities and free will. The contemporary human being represents the top of evolution, which must be fully respected as main

guidelines for the life of any person. On the given basis also the terms "good" and "evil" may be interpreted: what supports (or agrees to) or disturbs (or contradicts) the harmonic development of human society as well as of individual human beings; the rules representing natural law. Ethical relativism is in decisive contradiction to ontological approach.

The abandoning of ontological approach to knowledge has influenced the whole life of the human society. In the last century also the standard ethical and moral norms have been deformed similarly as the basic results in fundamental physical science as it has been demonstrated. The relations between people were deformed and the weight of human life was fundamentally degraded. There is not any doubt that the necessity of returning to ontological basis must occur in this field, too.

6.2 Several remarks to contemporary deformations in the human society

The contemporary social relations are very far from the conditions required on the basis of the ontological approach. Let us to introduce at least several remarks concerning this field. There is not any doubt that the awareness of equal responsibility of all people for harmonic evolution of human society evolution has been lost; *jus naturale* has been fully abandoned.

Instead of duties following from ontological reality other highest goal has been laid down for any human being: to grab (nab) the highest possible amount of money without any respect to abolishing many values belonging to others. New rules guaranteeing entitled (and only entitled) gains for the accomplished work should be newly formulated.

Also the responsibility for harmonic life of human society and any human life should represent the highest duty for all men and women. Maximal support must be devoted to ordinary existence of family that is the basis of harmonic evolution of human society. It must be fully respected, too, that the principal goal of relations between different sexes is to serve to developing the human life.

6.3 Human knowledge and ontological reality

However, let us return again to the basic human knowledge if any positive (non-falsified) statement may be denoted as tolerable. It means that all metaphysical (non-falsified) statements obtained on the basis of logical induction should be equally tolerated. And there is not any greater difference also in the case of similar statements derived from the Christian revelation if they were tested and not falsified. On the other side, one cannot tolerate any falsified statement.

As to the scientific knowledge the main problem concerns the fact that the most conclusions are based on mathematical models that are correlated to some sets of measured phenomenological values. Then the realistic ontology requires that also the corresponding causality should be tested as it was required already by Aristotle, but fully abandoned by the phenomenism of the 20^{th} century. It is not possible to relay on some isolated models when no correlations are tested between models describing the states following one after the other; the situation prevailing now in standard approaches of the contemporary theoretical physics. It concerns, of course all scientific regions where mathematical models are being made use of. Not respecting such principles may lead sometimes to very drastic false consequences.

7. Conclusion

Contemporary fundamental physical theory has abandoned fully the earlier ontological approach and has been based even on several serious mistaking assumptions; significantly deformed conclusions having been obtained.

All mistakes and knowledge deformations might and should be removed by returning to realistic ontology started already by Aristotle and further developed by Thomas Aquinas, on which practically the whole present technological progress has been based.

Returning to ontological basis may remove also practically all contemporary deformations dominating the (mainly European) human society when the highest value of the world evolution, i.e. the human life, has been significantly devaluated.

We are convinced that the broad human community should be informed about the corresponding situation in the whole science and invited to contribute to corresponding changes. All these facts influenced significantly also the known event in L´Aquila in Italy.

It should be appreciated that the new discipline of geoethics has started efforts to disclose the problems of the deformation of contemporary science very closely connected with many practical problems in Earth sciences.

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